Title	***Microminiature XBPM and Flux Monitor for High-Flux Micro-Focused Hard X-ray Beams***			
Project Requestor	Deming Shu			
Date	03-23-2008			
Group Leader(s)	John Quintana			
Machine or Sector Manager	Gabrielle Long and Efim Gluskin			
Category	X-ray science enablers and beam stability			
Content ID*	APS_1256819	Rev.	1	03/23/2008 4:12 PM

*This row is filled in automatically on check in to ICMS. See Note [1]

Description:

Start Year (FY)	**2009**	**Duration (Yr)**	**5**

Objectives:

To construct a prototype of microminiature diamond-based photoconductive beam position and flux monitor for high-flux micro-focused hard x-ray beams.

Benefit:

At the APS, it is expected that more beamlines will associated with x-ray micro-focusing capabilities in next five years. The proposed project will construct a prototype of microminiaturized diamond-based photoconductive beam position and flux monitor for high-flux micro-focused hard x-ray beams. It will support APS scientists and users for x-ray experimental instrumentation enhancement with real-time x-ray monitoring and feedback capabilities with minimized beam disturbance. The project will benefit APS users who may use high-flux micro-focused hard x-ray beams. The project will also benefit the development of advanced hard x-ray XBPM for APS front end (with same operational principle but different structural design for high-thermal-load).

Risks of Project: See Note [2]

NA

Consequences of Not Doing Project: See Note [3]

NA

Cost/Benefit Analysis: See Note [4]

NA

Description:

APS has developed XBPM techniques based on CVD-diamond's photoconductive properties in the past [1, 2]. It was tested in ESRF front end for about a year with good results [3]. Due to difficulties of finding reliable suppliers for special high quality CVD-diamond, this technique has not been applied for x-ray instrumentation widely.

With today's advanced CVD-diamond manufacturing technique, it is possible to develop a microminiaturized diamond-based photoconductive beam position and flux monitor for high-flux micro-focused hard x-ray beams. It will provide a useful diagnostic and/or real-time feedback tool for beamline instrumentation developers to enhance the system stability for micro-focused hard x-ray beam applications.

References:

[1] U.S. Patent granted No. 6,037,596, Photoconducting positions monitor and imaging detector, D. Shu, and T. M. Kuzay, 2000

[2] D. Shu, T. M. Kuzay, Y. Fang, J. Barraza, and T. Cundiff, Synthetic Diamond-Based Position-Sensitive Photoconductive Detector Development for the Advanced Photon Source, Journal of Synchrotron Radiation, (1998), 5, 636-638

[3] D. Shu, J. Barraza, T. M. Kuzay, G. Naylor, and P. Elleaume, Tests of the APS X-ray Transmitting Beam Position Monitors at ESRF, Proceedings of the 1997 International Particle Accelerator Conference (1998) 2210 – 2213

Funding Details

Cost: ($K)

Use FY08 dollars.

Year	AIP	Contingency
1	40	10
2	30	6
3	30	5
4	20	2
5	20	2
6		
7		
8		
9		
Total	140	

Contingency may be in dollars or percent. Enter figure for total project contingency.

Effort: (FTE)

The effort portion need not be filled out in detail by March 28

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1								0
2								0
3								0
4								0
5								0
6								0
7								0
8								0
9								0

Notes:

[1] **ICMS**. Check in first revision to ICMS as a *New Check In*. Subsequent revisions should be checked in as revisions to that document i.e. C*heck Out* the previous version and C*heck In* the new version. Be sure to complete the *Document Date* field on the check in screen.

[2] **Risk Assessment.** Advise of the potential impact to the facility or operations that may result as a consequence of performing the proposed activity. Example: If the proposed project is undertaken then other systems impacted by the work
include ... (If no assessment is appropriate then enter NA.)

[3] **Consequence Assessment.** Advise of the potential consequences to the facility or to operations if the proposal is not executed. Example: If the proposed project is not undertaken then ____ may happen to the facility. (If no assessment is appropriate then enter NA.)

[4] **Cost Benefit Analysis.** Describe cost efficiencies or value of the risk mitigated by the expenditure. Example: Failure to complete this maintenance project will result in increased total costs to the APS for emergency repairs and this investment of ___ will also result in improved reliability of ____. (If no assessment is appropriate then enter NA.)